

Identifying the Plasmopause Using Coordinated Ground-based Magnetometers, IMAGE-EUV, and KAGUYA-TEX Data

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A statistical study comparing the plasmopause location determined using Extreme Ultraviolet (EUV) and cross-phase measurements was performed over 50 days in May-July 2000 and one day in May 2008. In EUV images the plasmopause location was estimated using the sharp gradient in the brightness of 30.4 nm He⁺ emission. We have taken EUV images obtained by the IMAGE and the KAGUYA satellites, which were operated in a solar maximum and minimum periods, respectively. In the ground-based cross-phase measurement, the plasmopause was defined as a steep drop of mass density in its radial profile. Mass density was inferred from the eigenfrequency of field line resonances in the ULF band (~1-1000 mHz), which was deduced from geomagnetic field data using cross-phase analysis. The two measurements of the plasmopause have been compared in a same meridian at the same time and very good agreement was found in 18 of 19 events. Our result clearly indicates that the He⁺ and mass density plasmopause are usually detected at the same place. In only one event, the He⁺ and the mass density defined plasmapauses were not co-located. This event may be due to the difference of refilling time between He⁺ and other dominant species.